PES-0075

REMARKS

Claims 11 - 16 and 21 – 29 are pending in the present Application. Claims 11 and 25 – 27 have been amended and Claims 30 – 32 have been added, leaving Claims 11 – 16 and 21 - 32 for consideration upon entry of the present Amendment.

Claim 11 has been amended to provide clear antecedent basis for the term "mixture". Support for this amendment can be found in Claim 11 as originally filed.

Claim 27 has been amended to correct a typographical error, thereby correcting the claim dependency.

Claims 25 - 27 have been amended to clarify that the term "calibrating" has antecedent basis to the independent claim.

Claims 30 – 32 has been added to further claim the present invention. Support for these new claims can at least be found in Paragraphs [0029] and [0031] as originally filed.

None of these amendments narrow the scope of the present claims; they are merely grammatical. No new matter has been introduced by these amendments or new claims. Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 11 - 16 and 21 – 29 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 6,036,827 to Andrews et al. in view of Japanese Patent No. JP 401066537 A to Ono et al., as evidenced by U.S. Patent No. 6,006,582 to Bhandari et al. Applicants respectfully traverse this rejection.

As is set forth in the Office Action dated December 15, 2005 (hereinafter "OA 12/05"), Andrews et al. are relied upon to teach the concept of using a hydrogen detector in conjunction with an electrolyzer. (Pages 2 - 3) However, since Andrews et al. fail to teach or mention calibration of the hydrogen detector, Ono et al. is relied upon to teach calibrating a hydrogen gas detector. (*Id.* pages 3 - 4) (It is noted that Ono et al. teach a measuring cell 9 that comprises the hydrogen detector 10, and do not state a "measuring cell to give a known quantity of gas for measuring"; they also teach a reference hydrogen gas metering device and a sample gas metering device.) It is alleged that it would be obvious to calibrate the detector of Andrews et al. using the

method of Ono et al., stating that "[i]ntroducing a hydrogen-free gas provides a low-end signal values for calibration. Using air as the hydrogen free gas would be obvious...." (*Id.*) In other words, the alleged obviousness requires a change of the method relied upon because the method itself also fails to meet the present claims elements for calibration.

Bhandari et al. are then relied upon to teach the requirement of calibration of hydrogen sensors, including clean air calibration, in order to determine the proper detection... (*Id.* pages 4 - 5) Even with this alleged teaching of Bhandari et al., it is admitted that the references fail to teach flowing a known quantity of hydrogen gas from a hydrogen/water separator through a second conduit to the hydrogen gas detector. (*Id.*) Therefore, it is stated that "Ono teaches that the calibration system for the detector includes a measuring cell." (*Id.*) However, Ono et al., teach a measuring cell 9 comprising the hydrogen detector 10. (Ono et al. Abstract and Figure 1) They do not teach "that the calibration system for the detector includes a measuring cell"; the detector 10 is the measuring cell 9.

The OA 12/05 further alleges that an artisan "would recognize that a source of hydrogen gas is available from the hydrogen generating system taught in Andrews et al... and that the quantity of the sample gas would be determined by a measuring device taught in the Ono system..." (OA 12/05, page 5) However, Ono et al. teach a measuring cell comprising the detector, not a measuring device for determining a quantity of a sample from a redesigned system of Andrews et al.

The Examiner carries the burden of the establishment of a *prima facie* case of obviousness. Establishment of a *prima facie* case of obviousness requires that all elements of the invention are disclosed in the prior art; that the prior art relied upon contains some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

Andrews et al. are directed to a method and apparatus for chemically heating a catalyst bed, e.g., to promptly bring the catalyst bed to light-off temperatures. The system uses an

electrolyzer to produce hydrogen for introduction to the catalyst bed. (Col. 7, lines 33 -- 43) They teach the use of a "hydrogen detector 337... placed near the delivery system 10...". (Col. 21, lines 27 - 31) There is no teaching or suggestion in these sections of Andrews et al. cited in the OA 12/05 that the hydrogen detector is calibrated, or that it is in fluid communication with any portion of the system (e.g., designed so that a known quantity of hydrogen gas can flow from the hydrogen/water separator to the hydrogen gas detector as is claimed in the present application). As described in Andrews et al., only electrical communication of the hydrogen detector with the system is taught. Hence, to use anything other than a manual calibration (e.g., spray gas into the detector for calibration), would require physical redesigning of the system of Andrews et al. from the teaching. (no motivation)

The alleged motivation for combining Ono et al. with the teachings of Andrews et al. is that "a skilled artesian would understand that calibration of detectors is proper to ensure that the measured readings are accurate." (*Id.*, page 8) It is not denied that artisans manually calibrate detectors prior to installation to improve accuracy. However, knowledge of the desire to do this manual calibration does not render the present system obvious and fails to provide motivation for a redesign of the system of Andrews et al., or the combination of Andrews et al. with Ono et al.

The present system has a particular arrangement to enable calibration of the system. The present method allows automatic calibration and periodic calibration (see Claims 25 - 27 and 30 -- 32). As is discussed in the prior responses, neither Andrews et al. nor Ono et al., nor a combination thereof, teach the method of calibrating or the methods of operating electrochemical systems as claimed in the present application. Hence, alone and in combination, these references fail to render the claims obvious and fail to provide motivation to modify Andrews et al. to attain the present claimed methods.

Obviousness requires that all of the elements of the claims be disclosed in the prior art, and that there be motivation to combine the prior art to attain the claimed invention. Here, all of the elements are not taught and there is no motivation to modify the prior art to attain the present invention. Applicants identified a need in the art for more accurate hydrogen gas detection in an electrochemical system that eliminates the requirements for manual calibration of the detector. The present claims are directed to a specific method that includes the operation of the

electrochemical cell, the determination of a hydrogen concentration, and the calibration of the detector:

11. A process for operating an electrochemical system, comprising:

calibrating a hydrogen gas detector by

passing a hydrogen-free gas through a first conduit to the hydrogen detector, wherein the hydrogen gas detector generates a first signal;

flowing a mixture comprising a known quantity of hydrogen gas from a hydrogen/water separator through a second conduit to the hydrogen gas detector, wherein the hydrogen gas detector generates a second signal corresponding to a percentage of the hydrogen gas in the mixture; and

calibrating the hydrogen gas detector based upon the first and second signals;

introducing water to an electrolysis cell;

producing hydrogen;

separating hydrogen from water in the hydrogen/water separator;

introducing environmental gas disposed around electrochemical system components to the hydrogen gas detector; and

determining the hydrogen concentration in the environmental gas.

None of the references of record teach this method, and there is no motivation to combine the references, and then to redesign Andrews et al., to attempt to attain the present claims. A mere knowledge that calibration of the detector improves accuracy does not support a redesign of the system of Andrews et al. At best, this knowledge supports manually calibrating the detector of Andrews et al. prior to installation "near the system 10". It is not relevant what artisans could do, but what an artisan would be motivated to do with an expectation of success. That is, it is not relevant if an artisan could calibrate the hydrogen detector of Andrews et al., or if the artisan could redesign the system of Andrews et al. to calibrate in the fashion taught in Ono et al., or if the artisan could redesign the system of Andrews et al. to access hydrogen gas for calibration from a different source and to calibrate in a different manner. What is relevant, is what an artisan

would be motivated to do, with an expectation of success, from the teachings of Andrews et al. and Ono et al. Reconsideration and withdrawal of this rejection are respectfully requested.

Regarding Claim 13, it is not the specific element of Claim 13 that is being patented, but the combination established with independent Claim 11. The combination of the elements is not taught or obvious. This claims adds further novelty and is non-obvious.

Regarding Claims 25 – 27, namely the recalibration of the hydrogen detector, none of the references teach the present method or the method of repeating the calibration (e.g., to address for drift during use). Actually, no support has been provided to teach recalibration. Applicants contend that these claims add further novelty and are non-obvious.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and withdrawal of the rejection and allowance of the case are respectfully requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

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